

How to Install
the
 **ACAR**

"*Warm Coach*"

engine-aided heating
systems in motor homes
and mini homes

PLUMBING AND INSTALLATION
FOR EA-1 HEAT EXCHANGERS

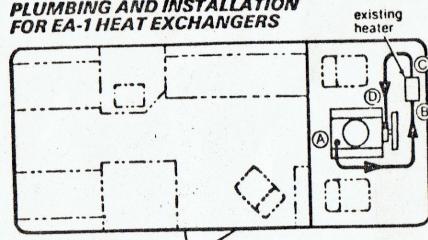


FIG. 1
Before Installation

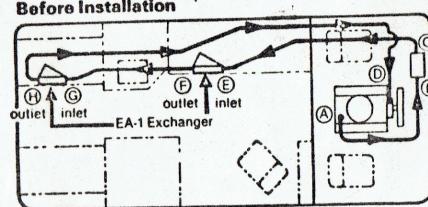


FIG. 2
After Installation

1. For best heating results, install one (1) EA-1 heat exchanger for each 10 to 11 ft. of total coach length for fully thermostatic operation.

2. PLAN exchanger locations, positions and hose routing BEFORE starting installation:

A. Locate exchanger(s) to obtain the most even distribution of heat (see fig. 2). Ideal location is in the top space beneath a seat or cabinet. BE SURE THE AIR INTAKE IS NOT BLOCKED OR STARVED. DO NOT MOUNT OUTSIDE OR UNDER THE VEHICLE.

B. Position exchangers for shortest possible hose routing that avoids kinks or sharp bends. The exchanger fitting CLOSEST TO VEHICLE FLOOR IS INLET (connects by hose to existing heater outlet as shown at "C" in fig. 2). The OUTLET fitting on the other end of the exchanger will then be higher (farthest from floor). This connects by hose to the next heat exchanger (or returns to vehicle's engine at "D" in fig. 2). Exchangers (s) may be positioned in any attitude as long as the *lowest* fitting is the water *inlet*.

3. Cut openings and mount exchanger(s) using the template and hardware supplied.

4. Connect hose and clamps (see specified types below) to exchanger(s) before disconnecting and discarding the existing hose between "C" and "D" in fig. 2. USE EXTREME CARE WHEN ATTACHING HOSES TO EXCHANGER INLET AND OUTLET NIPPLES — TWISTING OR BENDING WILL BREAK THE SOLDER CONNECTIONS AND CAUSE LEAKS. BE SURE THAT HOSE PASSING THROUGH PANELS OR FIREWALL ARE NOT SUBJECT TO CHAFING OR CUTTING. DO NOT ALLOW HOSE TO LAY AGAINST HOT ENGINE BLOCK OR EXHAUST PIPES.

WIRING AND CONTROLLER INSTALLATION:

1. Mount the EAC-1B controller on a clean, dry surface on the wires on the existing furnace. (Adhesive backing provided.) Only one EAC-1B controller is required per coach.

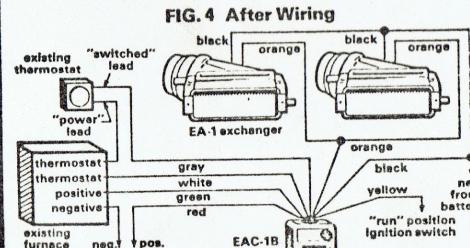
2. Using 14 AWG wire (or heavier), route and connect wires as shown in the diagram. To find the "switched" thermostat lead at the furnace thermostat connections, proceed as follows:

A. Apply voltage to the furnace and turn the thermostat on till the furnace blower comes on. Using a voltmeter or light bulb, you will find 12-v DC current at both thermostat connections.

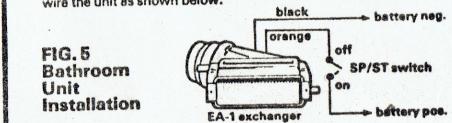
B. Turn the thermostat down till the furnace blower shuts off and check voltage at both thermostat connections again. THE "SWITCHED" LEAD WILL NOT HAVE VOLTAGE, WHILE THE "POWER" LEAD WILL. Connect gray wire from the EAC-1B controller to this "switched" lead connection going to the thermostat *only*. Connect the white wire to "switched" lead connection on the furnace.

FIG. 3
Before Wiring

FIG. 4 After Wiring



3. BATHROOM UNITS: If an EA-1 Heat Exchanger is to be plumbed into a bathroom, it should be operated independently of the automatically controlled units. Install a standard toggle switch in the bathroom and wire the unit as shown below:



SPECIFICATIONS:

EA-1 HEAT EXCHANGER

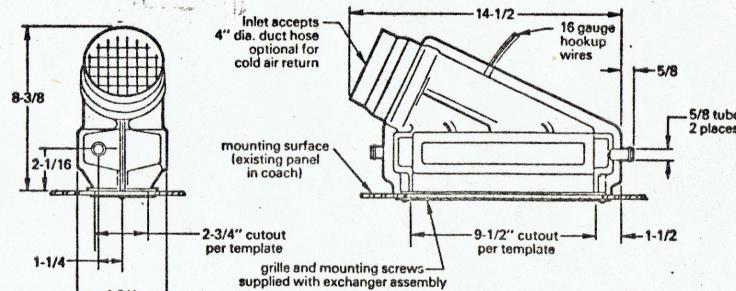
Operating voltage: 12-v DC nom.
Current draw: approx. 1 amp es.
Heat capacity: 10-12,000 BTUH
per exchanger at 180 to 190°F
water at 140°F M inlet flow.
Air flow: 130 CFM
Weight: 4.2 lb. (1.9 Kg.)

EAC-1B CONTROLLER:

Operating voltage: 12-v DC nom.
Fuse: standard 5 amp, 3AG.
Weight: 0.4 lb. (0.2 Kg.)

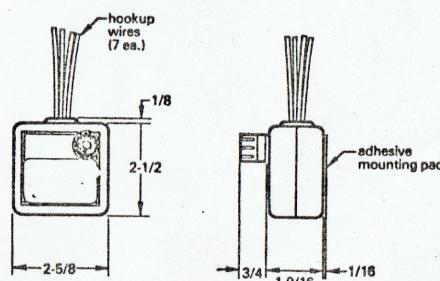
INTERCONNECTIONS:

Wire: (min. recommended) 14
AWG, copper, 105°C, UL listed.
Hose: 5/8" ID reinforced auto-
mobile heater hose.
Hose clamps: screw type, for 5/8" hose.



EA-1 EXCHANGER

NOTICE: Do Not attach hot air ducting from your forced air furnace to the intake duct of your heat exchanger.



EAC-1B CONTROLLER

NOTICE: Do Not attach wires from any heat exchanger other than the Acar Systems Heat Exchanger to the EAC-1B Controller.



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How to Install the "WarmTraveler" engine-aided heating system in VANS



PLUMBING AND INSTALLATION FOR EA-1 HEAT EXCHANGERS

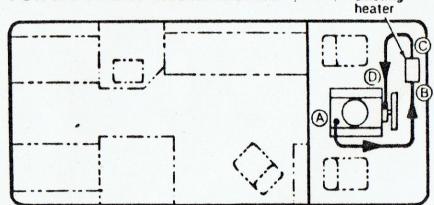


FIG. 1
Before installation

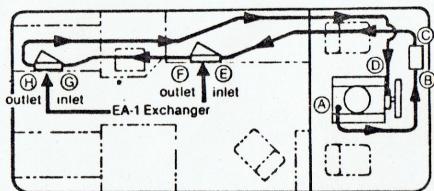


FIG. 2
After installation

1. For best heating results, install a minimum of one (1) EA-1 heat exchanger for average van heating requirements. In extreme cold conditions, a second exchanger can be added as shown above.

2. PLAN exchanger locations, positions and hose routings BEFORE starting installation.

A. Locate exchanger(s) to obtain the most even distribution of heat (see fig. 2). Ideal location is in the toe space beneath a seat or cabinet. BE SURE THE AIR INTAKE IS NOT BLOCKED OR STARVED. DO NOT MOUNT OUTSIDE OR UNDER THE VEHICLE.

B. Position exchangers for shortest possible hose routing that avoids kinks or sharp bends. The exchanger fitting CLOSEST TO VEHICLE FLOOR IS INLET connects by hose to existing heater outlet as shown at "C" in fig. 2). The OUTLET fitting on the other end of the exchanger will then be higher (farthest from floor). This connects by hose to the next heat exchanger (or returns to vehicle's engine at "D" in fig. 2). Exchanger(s) may be positioned in any attitude as long as the lowest fitting is the water inlet.

3. Cut openings and mount exchanger(s) using the template and hardware supplied.

4. Connect hose and clamps (see specified types below) to exchanger(s) before disconnecting and discarding the existing hose between "C" and "D" in fig. 2. USE EXTREME CARE WHEN ATTACHING HOSES TO EXCHANGER INLET AND OUTLET NIPPLES — TWISTING OR BENDING WILL BREAK THE SOLDER CONNECTIONS AND CAUSE LEAKS. BE SURE THAT HOSE PASSING THROUGH PANELS OR FIREWALL ARE NOT SUBJECTED TO CHAFING OR CUTTING. DO NOT ALLOW HOSE TO LAY AGAINST HOT ENGINE BLOCK OR EXHAUST PIPES.



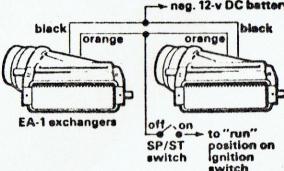
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WIRING FOR MANUAL OPERATION:

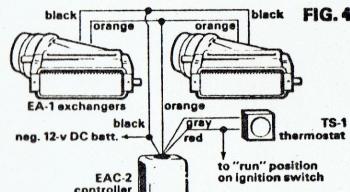
1. Mount a standard Single Pole/Single Throw toggle switch anywhere it is convenient in the vehicle. (Switch not included with heat exchangers.)
2. Connect wiring (minimum recommended gauge is 14 AWG, copper) as shown in fig. 3 below.

FIG. 3



WIRING FOR AUTOMATIC OPERATION:

1. Mount the TS-1 thermostat near the center of the vehicle and approximately one foot from the ceiling for ideal operation. (Mounting hardware supplied.) DO NOT MOUNT ON EXTERIOR WALL. DO NOT PLACE IN DIRECT LINE OF EXCHANGER AIR FLOW.
2. Mount the EAC-2 controller on a clean, dry interior surface anywhere it is convenient and accessible. DO NOT MOUNT IN ENGINE COMPARTMENT. (Adhesive backing is provided.)
3. Using 14 AWG copper wire (or heavier), route and connect wires as shown in fig. 4 except use standard solid copper 22 AWG wire to hook up the thermostat.



SPECIFICATIONS:

EA-1 HEAT EXCHANGER:

Operating voltage: 12-v DC nom.
Current draw: approx. 1 amp ea.

Heat capacity: 10-to-12,000 BTUH per exchanger at 180 to 190°F water at 3.0 GPM inlet flow.
Air flow: 130 CFM.
Weight: 4.2 lb. (1.9 Kg).

TS-1 THERMOSTAT

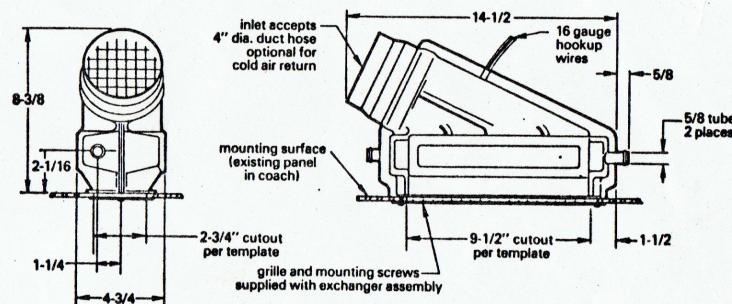
Operating voltage: 12-v DC nom.
weight: 0.2 lb. (0.1 Kg).

EAC-2 CONTROLLER:

Operating voltage: 12-v DC nom.
Weight: 0.2 lb. (0.1 Kg).

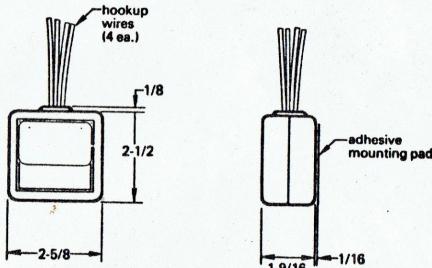
INTERCONNECTIONS:

Wire: (min. recommended) 14 AWG, copper, 105°C, UL listed.
Thermostat hook-up wire: 22 AWG solid copper.
Hose: 5/8" ID reinforced automotive heater hose.
Hose clamps: screw type, for 5/8" hose.



EA-1 EXCHANGER

NOTICE: Do Not attach hot air ducting from your forced air furnace to the intake duct of your heat exchanger



EAC-2 CONTROLLER

NOTICE: Do Not attach wires from any heat exchanger other than the ACAR Systems Heat Exchanger to the EAC-2 Controller.



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